

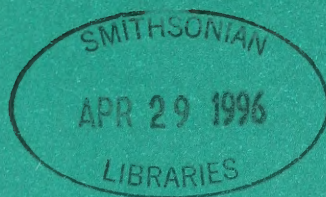
VOLUME 104 PART 12 FEBRUARY 1996

ISSN 0303-2515

QH
I
S67x
NH

ANNALS

OF THE SOUTH AFRICAN MUSEUM



CAPE TOWN



INSTRUCTIONS TO AUTHORS

1. MATERIAL should be original and not published elsewhere, in whole or in part.

2. LAYOUT should be as follows:

- (a) *Centred masthead to consist of*
Title: informative but concise, without abbreviations and not including the names of new genera or species
Author's(s) name(s)
Address(es) of author(s) (institution where work was carried out)
Number of illustrations (figures, enumerated maps and tables, in this order)
- (b) *Abstract* of not more than 200 words, intelligible to the reader without reference to the text
- (c) *Table of contents* giving hierarchy of headings and subheadings
- (d) *Introduction*
- (e) *Subject-matter* of the paper, divided into sections to correspond with those given in table of contents
- (f) *Summary*, if paper is lengthy
- (g) *Acknowledgements*
- (h) *References*
- (i) *Abbreviations*, where these are numerous.

3. MANUSCRIPT, to be submitted in triplicate, should be typewritten and neat, double spaced with 3 cm margins all round. First lines of paragraphs should be indented. Tables and a list of captions for illustrations should be typed separately, their positions indicated in the text. All pages should be numbered consecutively.

Major headings of the paper are centred capitals; first subheadings are shouldered small capitals; second subheadings are shouldered italics; third subheadings are indented, shouldered italics. Further subdivisions should be avoided, as also enumeration (never roman numerals) of headings and abbreviations.

Footnotes should be avoided unless they are short and essential.

Only generic and specific names should be underlined to indicate italics; all other marking up should be left to editor and publisher.

4. ILLUSTRATIONS should be reducible to a size not exceeding 12 × 18 cm (19 cm including caption); the reduction or enlargement required should be indicated (and preferably uniform); originals larger than 35 × 47 cm should not be submitted; photographs should be rectangular in shape and final size. A metric scale should appear with all illustrations, otherwise magnification or reduction should be given in the caption; if the latter, then the final reduction or enlargement should be taken into consideration.

All illustrations, whether line drawings or photographs, should be termed figures (plates are not printed; half-tones will appear in their proper place in the text) and numbered in a single series. Items of composite figures should be designated by capital letters; lettering of figures is not set in type and should be in lower-case letters. If Letraset is used authors are requested to use Helvetica-style lettering, if possible.

The number of the figure should be lightly marked in pencil on the back of each illustration.

5. REFERENCES cited in text and synonymies should all be included in the list at the end of the paper, using the Harvard System (*ibid.*, *idem*, *loc. cit.*, *op. cit.* are not acceptable):

(a) Author's name and year of publication given in text, e.g.:

- 'Smith (1969) describes ...'
- 'Smith (1969: 36, fig. 16) describes ...'
- 'As described (Smith 1969a, 1969b; Jones 1971)'
- 'As described (Haughton & Broom 1927) ...'
- 'As described (Haughton *et al.* 1927) ...'

Note: no comma separating name and year
pagination indicated by colon, not p.
names of joint authors connected by ampersand
et al. in text for more than two joint authors, but names of all authors given in list of references.

(b) Full references at the end of the paper, arranged alphabetically by names, chronologically within each name, with suffixes *a*, *b*, etc., to the year for more than one paper by the same author in that year, e.g. Smith (1969a, 1969b) and not Smith (1969, 1969a).

For books give title in italics, edition, volume number, place of publication, publisher.

For journal article give title of article, title of journal in italics (according to the *World list of scientific periodicals*, 4th ed. London: Butterworths, 1963), series in parentheses, volume number, part number in parentheses, pagination (first and last pages of article).

Examples (note capitalization and punctuation)

BULLOUGH, W. S. 1960. *Practical invertebrate anatomy*. 2nd ed. London: Macmillan.

FISCHER, P. H. 1948. Données sur la résistance et de la vitalité des mollusques. *Journal de conchyliologie* 88 (3): 100–140.

FISCHER, P. H., DUVAL, M. & RAFFY, A. 1933. Études sur les échanges respiratoires des littorines. *Archives de zoologie expérimentale et générale* 74 (33): 627–634.

KOHN, A. J. 1960a. Ecological notes on *Conus* (Mollusca: Gastropoda) in the Trincomalee region of Ceylon. *Annals and Magazine of Natural History* (13) 2 (17): 309–320.

KOHN, A. J. 1960b. Spawning behaviour, egg masses and larval development in *Conus* from the Indian Ocean. *Bulletin of the Bingham Oceanographic Collection, Yale University* 17 (4): 1–51.

THEILE, J. 1910. Mollusca. B. Polyplacophora, Gastropoda marina, Bivalvia. In: SCHULTZE, L. *Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Süd-Afrika ausgeführt in den Jahren 1903–1905* 4 (15). *Denkschriften der medizinisch-naturwissenschaftlichen Gesellschaft zu Jena* 16: 269–270.

(continued inside back cover)

ANNALS OF THE SOUTH AFRICAN MUSEUM
ANNALE VAN DIE SUID-AFRIKAANSE MUSEUM

Volume 104 Band
February 1996 Februarie
Part 12 Deel



ON THE MOULT, BREEDING SEASON,
AND DISTINCTIVENESS
OF SOUTHERN AFRICAN AVOCETS
RECURVIROSTRA AVOSETTA
(AVES, CHARADRII)

By

R. K. BROOKE

Cape Town

Kaapstad

The ANNALS OF THE SOUTH AFRICAN MUSEUM

are issued in parts at irregular intervals as material
becomes available

Obtainable from the South African Museum, P.O. Box 61, Cape Town 8000

Die ANNALE VAN DIE SUID-AFRIKAANSE MUSEUM

word uitgegee in dele op ongereelde tye na gelang van die
beskikbaarheid van stof

Verkrygbaar van die Suid-Afrikaanse Museum, Posbus 61, Kaapstad 8000

OUT OF PRINT/UIT DRUK

1, 2(1-3, 5-8), 3(1-2, 4-5, 8, t.-p.i.), 4(1), 5(1-3, 5, 7-9),
6(1, 2, t.-p.i.), 7(1-4), 8, 9(1-2, 7), 10(1-3), 11(1-2, 5, 7, t.-p.i.),
14(1-3), 15(4-5), 24(2, 5), 27, 31(1-3), 32(5), 33,
36(2), 43(1), 45(1), 49(1), 67(5, 11), 84(2)

Copyright enquiries to the South African Museum

Kopieregnavrae aan die Suid-Afrikaanse Museum

ISBN 0 86813 165 2

ON THE MOULT, BREEDING SEASON AND DISTINCTIVENESS OF SOUTHERN AFRICAN AVOCETS

RECURVIROSTRA AVOSETTA (AVES, CHARADRII)

By

R. K. BROOKE

*Percy FitzPatrick Institute of African Ornithology, University of Cape Town and
South African Museum*

(With 1 figure and 2 tables)

[MS accepted 14 July 1995]

ABSTRACT

Evidence was sought for the occurrence of Palearctic-bred black-crowned avocets, *Recurvirostra avosetta* Linnaeus, in southern Africa, primarily through time of moult of the primaries. No specimen of even probable Palearctic origin was found in South African collections. There is no reason to believe that Palearctic birds regularly come south of Lake Turkana in northern Kenya. Active moult has been noted between August and March. Breeding may take place at any time in southern Africa but July to October are the principal egg-laying months. Breeding is widespread but highly opportunistic in dry areas. Many pairs breed solitarily, small colonies are not rare, but colonies in excess of 100 pairs are known only from the Etosha National Park, Namibia. Iris colour of adults does not serve to distinguish southern African-bred birds from Palearctic ones. Southern African birds are shorter winged than Palearctic birds but probably have greater mass. There is no sexual dimorphism in linear measurements, as there is in Palearctic birds.

CONTENTS

	PAGE
Introduction	395
Methods	396
Moult of the primaries	396
Breeding season and distribution	396
Measurements	397
Iris and plumage colours	400
Conservation	400
Acknowledgements	401
References	401
Appendix 1: Synonymy	403
Appendix 2: Breeding localities	404

INTRODUCTION

Whether or not Palearctic-bred black-crowned avocets *Recurvirostra avo-setta* Linnaeus (see synonymy in Appendix 1) reach southern Africa is disputed on *a priori* grounds in the absence of data. For instance, among recent workers, Clancey (1980: 75) says 'Perhaps mainly visitor from Palearctic'; Maclean (1985: 261) says 'some birds resident and nomadic; others possibly nonbreeding Palearctic migrants'; Urban (1986: 196) says 'southern African populations probably Afrotropical in origin', a view that Pinto (1983) takes in respect of Angolan birds.

Following the approach of Brooke & Herroelen (1988) on distinguishing Afrotropical and Palearctic populations of the European bee-eater *Merops*

apiaster Linnaeus, I thought it possible that a study of the timing of the post-breeding moult of the primary wing feathers of specimens might elucidate the problem of whether Palearctic-bred *R. avosetta* reach southern Africa on migration. Palearctic birds lay eggs chiefly between April and June (Cramp & Simmons 1983) and southern African ones chiefly between August and November (Maclean 1985).

METHODS

Specimens from the natural history museums listed in Acknowledgements were borrowed and examined at the South African Museum, along with that institution's collection. Southern Africa provided 26 specimens: the three Cape Provinces 7, Namibia 17, KwaZulu-Natal 2; western Europe 7 specimens. Breeding localities are given in Appendix 2.

MOULT OF THE PRIMARIES

The moult of the primaries in southern African *R. avosetta* is descendant, and either symmetrical or close to it. Interrupted moult occurs in four of the adult specimens examined, presumably to facilitate opportunistic breeding in semi-arid and arid areas: two of these specimens are labelled as having gonads in full breeding condition. Four specimens show evidence of wave moult or, perhaps, resumption of moult at a point other than where it was interrupted.

Active moult was found in some southern African birds taken in August, November, December, February, and March. Others taken between November and February are in worn plumage, not fresh. In Palearctic birds, moult occurs chiefly from July to September (Cramp & Simmons 1983). Since Palearctic birds reach Morocco only in late August and would not reach Subsaharan Africa until, probably, October (Cramp & Simmons 1983), I conclude that if Palearctic birds occur in southern Africa, they do so in small numbers and have not been among the specimens examined. They would be in fresh plumage at a time when most southern African-bred birds were moulting their primaries or were in worn plumage.

BREEDING SEASON AND DISTRIBUTION

It is clear from Table 1 that August is the principal month in which southern African *R. avosetta* lay eggs, both in the winter rainfall south-western Cape and in the summer rainfall areas. However, far more than in the south-western Cape, opportunistic laying occurs in the semi-desert Karoo and regions to the north when conditions are suitable (e.g. Winterbottom & Rowan 1962). The November to May breeding records are examples of this. For instance, on 27 March 1989 I found a pair of avocets with two downy young on a farm dam (Boomrivier) in Bushmanland between Pofadder and Kenhardt, where the grandson of the owner told me that the dam had last held water in 1976.

Southern African *R. avosetta* are not obligate colonial breeders. Judging by the Southern African Ornithological Society (SAOS) nest record cards, the majority breed in small colonies of fewer than a dozen pairs and solitary

breeding is not rare: I have only seen one colony, and that a small one. However, in the Etosha National Park, Namibia, large colonies with well over 100 breeding pairs may be found, at least in some years (Namibian nest record card collection). These records were not used for breeding season analysis (Table 1) since they would swamp the data from single pairs and small colonies found elsewhere. 'Intensive recording of a few colonies [in one area] is a major source of bias in the patterns of these species' (Benson *et al.* 1964: 31).

TABLE 1
Southern African breeding records of *Recurvirostra avosetta* backdated to the months in which the eggs were certainly or probably laid.

J	A	S	O	N	D	J	F	M	A	M	J
South-western Cape (predominantly winter rainfall)											
4	68	50	14	1	—	—	—	1	1	—	4
Outside the south-western Cape (predominantly summer rainfall)											
15	26	7	12	5	7	3	1	5	10	3	4

Sources: Southern African Ornithological Society nest record card collection, the Namibian nest record card collection other than those for the Etosha National Park, W. R. J. Dean's nest record card collection, Sandberg (1908), Wyndham (1942), Vincent (1945), Broekhuysen & MacLeod (1948), MacLeod *et al.* (1951), Farkas (1962), Winterbottom & Rowan (1962), Robson & Sinclair (1976), Berruti (1980), Anon. (1981), MacCallum (1985), MacCallum & MacCallum (1985), Tarboton *et al.* (1987), Williams (1989), Tree (1992b), Skinner (1993), and personal records.

Breeding localities obtained from the literature, nest record card collections and personal observations are listed in Appendix 2 and mapped in Figure 1. It must be understood that in most cases opportunistic breeding takes place at these sites only when suitable waters are available. There is no fixed breeding range as in some species. Despite Pinto's (1983) doubts, *R. avosetta* probably also breeds at times in semi-arid south-western Angola.

MEASUREMENTS

Roberts (1932) pointed out that southern African *R. avosetta* were shorter winged than those of the Palearctic (214–222 mm vs 220–235 mm). This point does not seem to have been followed up. Measurements of specimens examined are presented in Table 2 from which it appears that the point is well made. Culmen lengths in both sexes are equivalent to those of females in western Europe given by Roselaar *in* Cramp & Simmons (1983). Tarsus lengths in both sexes are intermediate between those of males and females in western Europe (Cramp & Simmons 1983). Southern African birds do not show the sexual dimorphism in these characters shown by Palearctic birds.

Urban's (1986) mass data for *R. avosetta* are confused. The figures for 15 southern African birds ranging between 270 and 390 g are entered twice. Four females from Botswana are stated to weigh 202–217 g. These are the wing lengths given by Ginn (1976) for four females, and not weights at all.

Present knowledge of mass data shows that southern African birds appear to be heavier than east African or Palearctic birds, though the difference is not

significant. For southern Africa, Summers & Waltner (1979) gave 270–390 g, av. (15) 318.7 g (used by Maclean 1985 and Urban 1986). SAFRING's mass data file gives 274.5–366 g, av. (13) 326.9 g. Setting aside the females from Botswana mentioned above, Urban (1986) gave the masses of two males from Botswana as 375.8 and 385.9 g; these figures come from Ginn (1976). Ginn (1976) added for females 311.1–348.1 g, av. (6) 324 g.

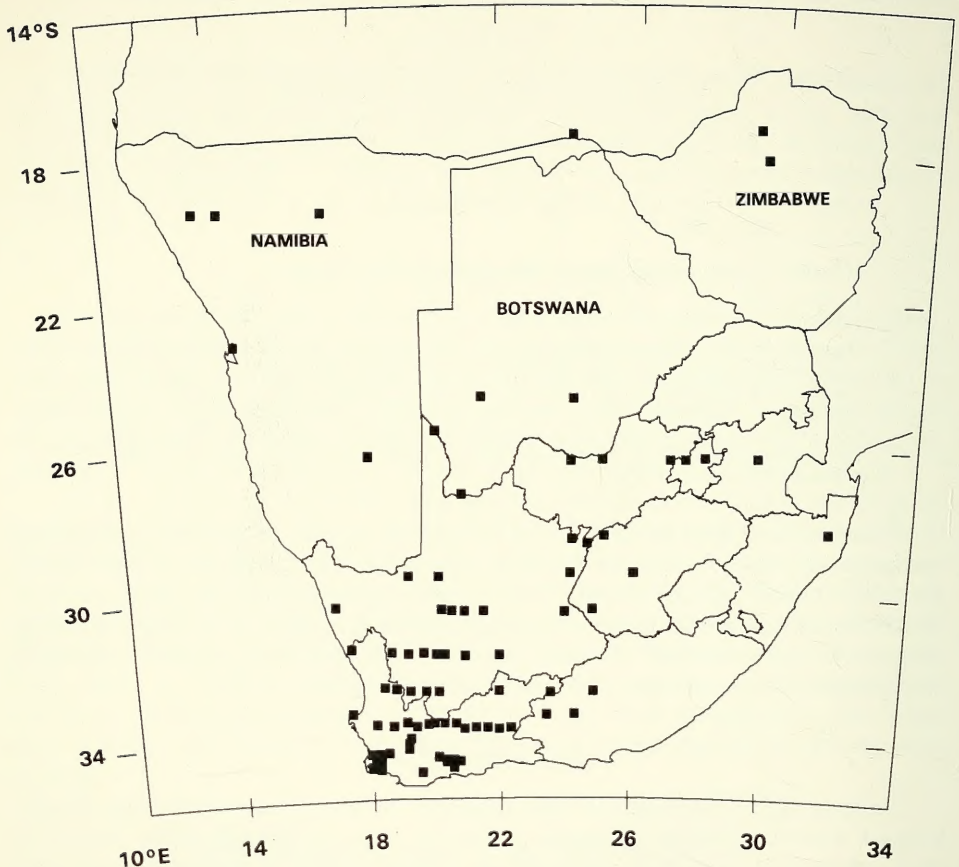


Fig. 1. Map showing southern African localities where *Recurvirostra avosetta* has bred (listed in Appendix 2).

For east Africa, Britton (1970) gave 225–305 g, av. (5) 266 g for unsexed birds, 270 g for one female and 285 g for one male. Urban (1986) added 195–265 g for 15 unsexed birds and SAFRING's mass data file 225–310 g, av. (10) 274.8 g, s.d. 25.39. Masses of adult Palearctic birds given by Roselaar in Cramp & Simmons (1983) range 219–435 g, av. (42) 298.2 g. It appears that the shorter wing length of southern African birds is not reflected in a lower mass than in Palearctic birds, allowing for the larger sample of Palearctic birds. Southern African birds may actually be even heavier on average than Palearctic birds.

TABLE 2
Standard measurements of adult southern African *R. avosetta* compared with those of the western Palearctic in Cramp & Simmons (1983). n = sample size; s.d. = standard deviation; * = significant at the 95 per cent level.

Measurement	Southern Africa				Western Palearctic			
	Males		Females		Males		Females	
	n	Range	Mean ± s.d.	n	Range	Mean ± s.d.	n	Range Mean ± s.d.
Wing (mm)	7	210-225	218.7 ± 4.99*	12	207-220	216.2 ± 4.76*	20	219-231 226.0 ± 3.50*
Culmen (mm)	3	74.7-83.4	80.3	8	76.8-88.1	82.0 ± 4.07*	28	72-85 86.1 ± 2.47
Tarsus (mm)	7	81.6-90.2	85.6 ± 3.01*	13	73.6-91.3	85.4 ± 5.02*	24	77-86 88.9 ± 2.63*
Mass (unsexed) (g)								
SAFRING	13	274-366	326.9 ± 29.5				42	219-435 298.2 ± 52.0
Summers & Waltner (1979)	15	270-390	318.7 ± 32.6					
Mass (sexed) (g)								
Ginn (1976)	2	376-386		6	311-348		324	

IRIS AND PLUMAGE COLOURS

Tree (1992a) has recently pointed out that all the adult southern African *R. avosetta* he has handled have had red irides, not brown as in Palearctic birds (Cramp & Simmons 1983). This observation is supported by some published colour photographs: Newman (1979: 99), Frandsen (1982: 98), Ginn (1989: 256), Hockey (1991: 53), but not by Nichol's breeding bird (1971: 71) and Sinclair (1984: 117), both of which have brown irides. An examination of the FitzPatrick Institute's slide collection revealed 38 slides showing a red iris and 24 showing a brown one. Some of the birds with brown irides may well have been immatures, as stated by Tree (1992a). Seven were sitting on nests. From details of the background, it is clear that in several cases multiple slides were taken of particular individuals, and that it would not be warranted to claim that seven separate birds with brown irides were photographed on the nest in the Western Cape Province. To reduce the number of brown-eyed adults still further, at least one shows a red iris in some slides. It is clear that the majority of southern African adult *R. avosetta* have red irides.

However, the iris colour of Palearctic birds seems to have been markedly over-simplified by Cramp & Simmons (1983). In the primary literature, Hartert (1921) stated that the iris colour is dark red-brown to nut-brown, but does not mention a sex linkage. Meinertzhagen (1943) and Glutz von Blotzheim *et al.* (1977) stated that males have red or red-brown irides and females hazel irides. Hayman *et al.* (1986) stated that the colour is brown, but their illustration shows a bird with a red-brown iris. It appears that iris colour is not a practical means of separating Palearctic and southern African *R. avosetta*.

There is some tendency for southern African birds to have more melanin, or lesser areas of white, in the inner primaries than in Palearctic birds. But again, the character is not absolute and cannot by itself be used to distinguish Palearctic and southern African-bred *R. avosetta*.

CONSERVATION

The mensural data presented above and in Table 2, support the view that southern African breeding *R. avosetta* do not form part of the population that breeds in the Palearctic. That Palearctic birds do reach Subsaharan Africa is shown by a ringing recovery from Senegal (Glutz von Blotzheim *et al.* 1977). In addition, the great flocks seen locally in west Africa during the northern winter, summarized in Urban (1986), are almost certainly Palearctic birds in their winter quarters. Britton (1980) considered the regular occurrence of Palearctic birds to be doubtful in East Africa south of Lake Turkana. This seems a correct appreciation and is supported by Dowsett (1978), Cramp & Simmons (1983) and Urban (1986).

It has been shown above that southern African breeding black-crowned avocets *R. avosetta* are a distinct biological entity. Some consideration should therefore be given to the need for conservation of southern African breeding birds. Drainage and alteration of wetlands has deprived them of some breeding sites, as on the Cape Flats where the sites mentioned by Wyndham (1942), Broekhuysen & MacLeod (1948) and MacLeod *et al.* (1951) have almost

entirely been drained and built over. But the species readily breeds at man-made waterbodies when conditions are suitable. Because it is predominantly an inhabitant of drier areas, it breeds opportunistically, and unpredictably, at temporarily suitable sites. Temporarily suitable sites may dry up before the young have fledged. They are then subject to mammalian predation. This could be mitigated by adding water to such sites, but in semi-arid areas such water is not normally available.

Active management on behalf of *R. avosetta* does not seem to be needed in the absence of widespread threats to its well-being as a breeding species. Furthermore, it is exceedingly difficult to institute proactive conservation for a species without a fixed breeding range.

ACKNOWLEDGEMENTS

I am obliged to the directors and ornithologists of the Durban Natural Science Museum, the East London Museum, the South African Museum, Cape Town, the State Museum, Windhoek, the Transvaal Museum, Pretoria, and the Institute of Taxonomic Zoology, Amsterdam, for access to or the loan of specimens. I am obliged to Dr T. B. Oatley, officer in charge of SAFRING, for mass data and for the loan of SAOS nest record cards; to Mr J. A. Harrison, officer in charge of SABAP, for a list of breeding localities in the atlas data as at the end of 1990; to Dr C. J. Brown for photocopies of Namibian nest record cards; to Mr W. R. J. Dean for photocopies of his nest record cards; and to Dr D. W. Snow for highly pertinent comments on an earlier version of this work.

REFERENCES

- ANDERSSON, C. J. & GURNEY, J. H. 1872. *Notes on the birds of Damaraland and the adjacent countries of south-west Africa*. London: John van Voorst.
- ANON. 1981. Breeding records. *Babbler* 1: 16.
- BENSON, C. W., BROOKE, R. K. & VERNON, C. J. 1964. Bird breeding data for the Rhodesias and Nyasaland. *Occasional Papers of the National Museums of Southern Rhodesia* 27B: 30–105.
- BERRUTI, A. 1980. Status and review of waterbirds breeding at Lake St Lucia. *Lammergeyer* 28: 1–19.
- BRITTON, P. L. 1970. Some non-passerine bird weights from east Africa. *Bulletin of the British Ornithologists' Club* 90 (5): 142–144.
- BRITTON, P. L. ed. 1980. *Birds of east Africa—their habitat, status and distribution*. Nairobi: East Africa Natural History Society.
- BROEKHUYSEN, G. J. & MACLEOD, J. G. R. 1948. Avocets (*Recurvirostra avosetta*) breeding in the vicinity of Cape Town. *Ostrich* 19 (2): 148–149.
- BROOKE, R. K. & HERROELEN, P. 1988. The nonbreeding range of southern African bred European bee-eaters *Merops apiaster*. *Ostrich* 59 (2): 63–66.
- CLANCEY, P. A. ed. 1980. *S.A.O.S. checklist of southern African birds*. Johannesburg: Southern African Ornithological Society.
- CRAMP, S. & SIMMONS, K. E. L. eds. 1983. *The birds of the western Palearctic* 3. Oxford: Oxford University Press.
- DOWSETT, R. J. 1978. *Recurvirostridae*. In: SNOW, D. W. ed. *An atlas of speciation in African non-passerine birds*: 185–186. London: British Museum (Natural History).
- FARKAS, T. 1962. Contribution to the bird fauna of Barberspan. *Ostrich* suppl. 4: 1–39.
- FRANDSEN, J. 1982. *Birds of the south western Cape*. Sloane Park: Sable Publishers.
- GINN, P. J. 1976. Birds of Makgadigadi: a preliminary report. *Wagtail* 15: 21–96.

- GINN, P. J. ed. 1989. *The complete book of southern African birds*. Cape Town: Struik, Winchester.
- GLUTZ VON BLOTZHEIM, U. N., BAUER, K. M. & BEZZEL, E. eds. 1977. *Handbuch der Vögel mitteleuropas* 7. Wiesbaden: Akademische Verlagsgesellschaft.
- HARTERT, E. 1921. *Die Vögel der paläarktischen Fauna* 2. Berlin: Friedländer.
- HAYMAN, P., MARCHANT, J. & PRATER, T. 1986. *Shorebirds: an identification guide to the waders of the world*. London: Croom Helm.
- HOCKEY, P. A. R. 1991. *Birds of southern Africa*. Cape Town: Struik Publishers.
- LAYARD, E. L. & SHARPE, R. B. 1884. *The birds of South Africa*. London: Quaritch.
- LINNAEUS, C. 1758. *Systema naturae* 1. (1956 edition.) Stockholm: Salvius.
- MACCALLUM, R. B. 1985. More on black-crowned avocets breeding in Zimbabwe. *Honeyguide* 31 (1): 54.
- MACCALLUM, R. B. & MACCALLUM, I. O. 1985. First breeding of the black-crowned avocet in Zimbabwe. *Honeyguide* 31 (1): 54.
- MACLEAN, G. L. 1985. *Roberts' birds of southern Africa*. Cape Town: John Voelcker Bird Book Fund.
- MACLEOD, J. G. R., MURRAY, E. M. & MURRAY, C. D'C. 1951. The birds of the Hottentots Holland (part 1). *Ostrich* 22 (3): 179-189.
- MEINERTZHAGEN, A. C. 1943. Description of the avocet. In: WITHERBY, H. F., JOURDAIN, F. C. R., TICEHURST, N. F. & TUCKER, B. W. eds. *The handbook of British birds* 4: 412-413. London: H. F. & G. Witherby.
- NEWMAN, K. 1979. *Birdlife in southern Africa*. Johannesburg: Macmillan, South Africa.
- NICHOL, W. 1971. *Suid-Afrikaanse voëls fotobeelde in kleur, met beskrywings*. Cape Town: Tafelberg-Uitgewers.
- PINTO, A. A. DA R. 1983. *Ornitologia de Angola* 1. Lisbon: Instituto de Investigação Científica Tropical.
- REICHENOW, A. 1900. *Die Vögel Afrikas* 1. Neudamm: Neumann.
- ROBERTS, A. 1932. Migration of African birds. *Ostrich* 3 (3): 97-109.
- ROBSON, N. F. & SINCLAIR, J. C. 1976. Avocet *Recurvirostra avosetta*. In: New distributional data. *Ostrich* 47 (4): 218.
- SANDBERG, A. 1908. The fauna of the Barotse valley. *Proceedings of the Rhodesia Scientific Association* 7: 31-42.
- SEEBOHM, H. 1887. *The geographical distribution of the Charadriidae or the plovers, sandpipers, snipes, and their allies*. London: Sotheman.
- SHARPE, R. B. 1896. Catalogue of the Limicolae in the collection of the British Museum. *Catalogue of the birds in the British Museum* 24: i-xii, 1-794.
- SINCLAIR, J. C. 1984. *Ian Sinclair's field guide to the birds of southern Africa*. Cape Town: Struik Publishers.
- SKEAD, C. J. 1967. Ecology of birds in the eastern Cape Province. *Ostrich* suppl. 7: 1-103.
- SKINNER, N. J. 1993. The nest record card scheme. *Babbler* 25: 43-46.
- SUMMERS, R. W. & WALTNER, M. 1979. Seasonal variation in the mass of waders in southern Africa, with special reference to migration. *Ostrich* 50 (1): 21-37.
- TARBOTON, W. R., KEMP, M. I. & KEMP, A. C. 1987. *Birds of the Transvaal*. Pretoria: Transvaal Museum.
- TREE, A. J. 1992a. Eye colour in southern African avocets. *Honeyguide* 38 (1): 22.
- TREE, A. J. 1992b. The first successful breeding of avocets in Zimbabwe. *Honeyguide* 38 (1): 22-23.
- URBAN, E. K. 1986. Family Recurvirostridae: stilts and avocets. In: URBAN, E. K., FRY, C. H. & KEITH, K. eds. *The birds of Africa* 2: 193-198. London: Academic Press.
- VINCENT, A. W. 1945. On the breeding habits of some African birds. *Ibis* 87 (3): 345-365.
- WILLIAMS, J. 1989. Avocet and pratincole nesting at Chegutu. *Honeyguide* 35 (2): 71-73.
- WINTERBOTTOM, J. M. & ROWAN, M. K. 1962. Effect of rainfall on breeding birds in arid areas. *Ostrich* 33 (2): 77-78.
- WYNDHAM, C. 1942. Nest and eggs of the avocet (*Recurvirostra avosetta*). *Ostrich* 13 (2): 70-74.

APPENDIX 1

Synonymy of *Recurvirostra avosetta* Linnaeus based primarily on Seebohm (1887), Sharpe (1896), Reichenow (1900) and Hartert (1921).

Recurvirostra Linnaeus, 1758: 151. Type by monotypy *Recurvirostra avosetta* Linnaeus.

Scolopax Linnaeus, 1758: 145. Type by tautonymy *Scolopax rusticola* Linnaeus.

Avocetta Brisson, 1760: 538. Type by virtual tautonymy *Recurvirostra avosetta* Linnaeus.

Himantopus Brisson, 1760: 46. Type by tautonymy *Charadrius himantopus* Linnaeus.

Recurvirostra avosetta Linnaeus, 1758: 151. Öland, Sweden.

Scolopax avocetta Scopoli, 1769: 92. Europe.

Avocetta recurvirostra Boddaert, 1783: 21. A typographical transposition of Linnaeus's name whose reference number is correctly given; probably not a use of Brisson's generic name.

Avocetta europaea Dumont, 1816: 339. *Nom. nov. pro R. avosetta* Linnaeus.

Recurvirostra tephroleuca Vieillot, 1820: 360. Senegal. Based on an immature or partly leucistic specimen.

Recurvirostra fissipes C. L. Brehm, 1831: 686. Pomeranian coast of Germany.

Recurvirostra helebi A. E. Brehm, 1854: 84. Egypt.

Recurvirostra helevi A. E. Brehm, 1855: 326. Invalid correction of *R. helebi* A. E. Brehm.

Recurvirostra avosetta natans A. E. Brehm, 1866. *Nomen nudum*.

Recurvirostra sinensis Swinhoe, 1867: 401. Amoy (= Xiamen), China.

Himantopus avocetta Seebohm, 1885: 74. Europe.

APPENDIX 2

Localities at which *Recurvirostra avosetta* have been recorded breeding in southern Africa based on the Southern African Ornithological Society's nest record card collection (including author's records), the Namibian nest record card collection, the Dean nest record card collection, Southern African Bird Atlas Project (SABAP) up to the end of 1990, and literature cited.

Western Cape Province: Rimmerskraal (Bredasdorp), Springfield Estates (Bredasdorp), Alderman's Farm (Somerset West), Eerste River estuary (Somerset West), Faure (Stellenbosch), Swartklip and other pans on the Cape Flats (Wyndham 1942; Broekhuysen & MacLeod 1948; MacLeod *et al.* 1951), Strandfontein Sewage Works (Cape Flats), Rietvlei (Milnerton), Bloubergstrand, Vissershok (Bellville), Occultdale (Durbanville), Melkbosstrand, Duinefontein (Melkbosstrand), between Darling and Yzerfontein, Yzerfontein, Saldanha, Langebaanweg, Gansefontein (Hopefield), between Langebaanweg and Vredenburg, Velddrif (Layard & Sharpe 1884), Piketberg, Wadrifsoutpan, Barrydale, Ladismith, Prince Albert, Nieuweveld Mnts (north of Beaufort West), Saucyskuil (south-east of Beaufort West), Uniondale.

Eastern Cape Province: Aberdeen, Cradock (Skead 1967).

Northern Cape Province: Rietfontein Salt Works (coast of southern Namaqualand) (SAM), Garies, Colesberg (Layard & Sharpe 1884), Groblersshoop, 25 km north of Loxton, Rooipoort (Middelpos), Calvinia, Kootjieskolk, between Williston and Carnarvon, between Nieuwoudtville and Loeriesfontein, between Loeriesfontein and Kenhardt, Commissioner's Pan, Brandvlei, Boomrivier (between Kenhardt and Pofadder), between Pofadder and Aggeneys, Brandvlei, De Aar, between Kimberley and Griekwastad, Barkly West.

Orange Free State Province: Luckoff, Sophiasdal (Bloemfontein), Bultfontein.

KwaZulu-Natal Province: Lake St Lucia (Robson & Sinclair 1976; Berruti 1980).

Eastern Transvaal Province: Near Amersfoort (Tarboton *et al.* 1987).

Gauteng Province: Rondebult (Johannesburg) (Tarboton *et al.* 1987), Blesbok Spruit (Springs), Nooitgedacht (Nigel).

North-west Province: Vryburg, Barberspan (Farkas 1962).

Botswana: Kgoro Pan (Skinner 1993), Tshane Pan (Anon. 1981).

Namibia: Ausisfontein, Hoanib Salt Pan, Klein Oase by Hoarisib River (all three in Skeleton Coast Park), Swakopmund, Walvis Bay, Neute Dam (Keetmanshoop), Damaraland (Andersson & Gurney 1872), Halali (Etosha National Park).

Zambia: Zambezi River (Barotseland) (Sandberg 1908).

Zimbabwe: Darwendale Dam (MacCallum 1985; MacCallum & MacCallum 1985), Chegutu (Williams 1989; Tree 1992b).

6. SYSTEMATIC papers must conform to the *International code of zoological nomenclature* (particularly Articles 22 and 51).

Names of new taxa, combinations, synonyms, etc., when used for the first time, must be followed by the appropriate Latin (not English) abbreviation, e.g. gen. nov., sp. nov., comb. nov., syn. nov., etc.

An author's name when cited must follow the name of the taxon without intervening punctuation and not be abbreviated; if the year is added, a comma must separate author's name and year. The author's name (and date, if cited) must be placed in parentheses if a species or subspecies is transferred from its original genus. The name of a subsequent user of a scientific name must be separated from the scientific name by a colon.

Synonymy arrangement should be according to chronology of names, i.e. all published scientific names by which the species previously has been designated are listed in chronological order, with all references to that name following in chronological order, e.g.:

Family **Nuculanidae**

Nuculana (Lembulus) bicuspidata (Gould, 1845)

Figs 14–15A

Nucula (Leda) bicuspidata Gould, 1845: 37.

Leda plicifera A. Adams, 1856: 50.

Laeda bicuspidata Hanley, 1859: 118, pl. 228 (fig. 73). Sowerby, 1871: pl. 2 (fig. 8a–b).

Nucula largillierti Philippi, 1861: 87.

Leda bicuspidata: Nicklès, 1950: 163, fig. 301; 1955: 110. Barnard, 1964: 234, figs 8–9.

Note punctuation in the above example:

comma separates author's name and year

semicolon separates more than one reference by the same author

full stop separates references by different authors

figures of plates are enclosed in parentheses to distinguish them from text-figures

dash, not comma, separates consecutive numbers.

Synonymy arrangement according to chronology of bibliographic references, whereby the year is placed in front of each entry, and the synonym repeated in full for each entry, is not acceptable.

In describing new species, one specimen must be designated as the holotype; other specimens mentioned in the original description are to be designated paratypes; additional material not regarded as paratypes should be listed separately. The complete data (registration number, depository, description of specimen, locality, collector, date) of the holotype and paratypes must be recorded, e.g.:

Holotype

SAM-A13535 in the South African Museum, Cape Town. Adult female from mid-tide region, King's Beach, Port Elizabeth (33°51'S 25°39'E), collected by A. Smith, 15 January 1973.

Note standard form of writing South African Museum registration numbers and date.

7. SPECIAL HOUSE RULES

Capital initial letters

- The Figures, Maps and Tables of the paper when referred to in the text
e.g. '... the Figure depicting *C. namacolus* ...': '... in *C. namacolus* (Fig. 10) ...'
- The prefixes of prefixed surnames in all languages, when used in the text, if not preceded by initials or full names
e.g. Du Toit but A. L. du Toit; Von Huene but F. von Huene
- Scientific names, but not their vernacular derivatives
e.g. Therocephalia, but therocephalian

Punctuation should be loose, omitting all not strictly necessary

Reference to the author should preferably be expressed in the third person

Roman numerals should be converted to arabic, except when forming part of the title of a book or article, such as

'Revision of the Crustacea. Part VIII. The Amphipoda.'

Specific name must not stand alone, but be preceded by the generic name or its abbreviation to initial capital letter, provided the same generic name is used consecutively. The generic name should not be abbreviated at the beginning of a sentence or paragraph.

Name of new genus or species is not to be included in the title; it should be included in the abstract, counter to Recommendation 23 of the Code, to meet the requirements of Biological Abstracts.



R. K. BROOKE

ON THE MOULT, BREEDING SEASON,
AND DISTINCTIVENESS
OF SOUTHERN AFRICAN AVOCETS
RECURVIROSTRA AVOSETTA (AVES, CHARADRII)